Code ..... **Course item: .....**

1. INFORMATION ABOUT THE COURSE

A. Basic information

Name of course	***Smart Grid***
Study level	*First degree*
Unit running the study programme	*Faculty of Telecommunication, Computer Science and Electrical Engineering*
Study programme	*Electrical Engineering*
Speciality	
Name of teacher (s) and his academic degree	*Piotr Kiedrowski, PhD*
Introductory courses	*Introduction to Electrical Engineering*
Prerequisites	*No prerequisites*

B. Semester/week schedule of classes

Semester	Lectures	Classes	Laboratories	Project	Seminars	Field exercises	ECTS
winter or summer	15		15				8

2. EFFECTS OF EDUCATION (acc. to National Qualifications Framework)

Knowledge	*on successful completion of the course student is supposed to know the transformational impacts of the smart grid on the industry*
Skills	*on successful completion of the course student is supposed to be able to configure and reconfigure Smart Grid, interpret alarms and detect faults*
Competences	*on successful completion of the course student is supposed to control Layer Infrastructure, Software-Define Networks, to integrate legacy systems and is familiar with Smart Grid Applications*

3. TEACHING METHODS

multimedia lecture, lab, method of cases

4. METHODS OF EXAMINATION

written exam once per semester, oral presentation, short paper at the beginning of every lab

5. SCOPE

Lectures	*Introduction to the smart grid, including objectives and functions, views of the smart grid within the industry, and design criteria.* *Overview of the electric grid, covering traditional grid components and new grid technologies, such as energy storage, distributed generation, and micro-grids.* *Smart grid control elements required to monitor and control the grid, such as smart meters, sensors, and phasor measurement units.* *Communications and interoperability, including communications requirements, reliability, security, and technologies, from PLC to wireless.* *Smart grid operations, covering control and management functions, operations architectures, and information models.* *Smart grid control layer, including real-time functions such as voltage and frequency monitoring and control, fault detection and location, and security and policy management; control algorithms such as management of voltage, energy storage, and distributed generation; and integration of legacy systems.*
Laboratories	*SCADA (supervisory control and data acquisition)*

	Functions and function architecture *Performance Management* *Accounting Management* *Configuration Management* *Fault Management* *Security Management* *Common Information Model (CIM)* *Process architecture* *Fault Location Service Provisioning* *Smart Grid Applications Layer* *Smart Grid Control Layer*

6. **LITERATURE**

Basic literature	*Bush S.F.: Smart Grid: Communication-Enabled Intelligence for the Electric Power Grid. Wiley-IEEE Press 2014, 570 pages* *Short T. A: Electric Power Distribution Handbook. Second Edition. CRC Press Inc. 2014, 898 pages*
Supplementary literature	*Kiedrowski P.: Toward More Efficient and More Secure Last Mile Smart Metering and Smart Lighting Communication Systems with the Use of PLC/RF Hybrid Technology, International Journal of Distributed Sensor Networks, Vol. 2015, Article ID 675926, pp. 1-9, 2015, http://dx.doi.org/10.1155/2015/675926* *Kiedrowski P.: Errors Nature of the Narrowband PLC Transmission in Smart Lighting LV Network, International Journal of Distributed Sensor Networks, Vol. 2016, Article ID 9592679, pp. 1-9, 2015, http://dx.doi.org/10.1155/2016/9592679*